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# Decomposing World Income Distribution

## Does the World Have a Middle Class?

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In Asia inequality in income between countries is more important than inequality within countries. In Africa, Latin America, and Western Europe and North America, by contrast, there are only small differences between countries; inequality within countries is more important. And when countries are divided into three groups by income level, there is little overlap—very few people in developing countries have incomes in the range of those in the rich countries.

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## Summary findings

Using national income and expenditure distribution data from 119 countries, Milanovic and Yitzhaki decompose total income inequality between the individuals in the world, by continent and by "region" (countries grouped by income level). They use a Gini decomposition that allows for an exact breakdown (without a residual term) of the overall Gini by recipients.

Looking first at income inequality in income between countries is more important than inequality within countries. Africa, Latin America, and Western Europe and North America are quite homogeneous continents, with small differences between countries (so that most of the inequality on these continents is explained by inequality within countries).

Next the authors divide the world into three groups: the rich G7 countries (and those with similar income levels), the less developed countries (those with per capita income less than or equal to Brazil's), and the middle-income countries (those with per capita income between Brazil's and Italy's). They find little overlap between such groups—very few people in developing countries have incomes in the range of those in the rich countries.

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This paper—a product of tPoverty and Human Resources, Development Research Group—is part of a larger effort in the group to study inequality and income redistribution. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Patricia Sader, room MC3-556, telephone 202-473-3902, fax 202-522-1153, email address psader@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. Branko Milanovic may be contacted at bmilanovic@worldbank.org. March 2001. (41 pages)

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# DECOMPOSING WORLD INCOME DISTRIBUTION :

# DOES THE WORLD HAVE A MIDDLE CLASS?

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## Section 1: Introduction

Recent heightened awareness of globalization is also reflected in the interest in issues of international and global inequality. This is, of course, expected since once we begin thinking of the globe as a single unit, then the distribution of income (or welfare) among world citizens becomes a natural topic. Milanovic (1999) has derived world income distribution, the first time such a distribution was calculated from individual countries' household surveys—formally in the same way as one would calculate national income distribution from regional distributions. Similar computations were also recently performed by T. Paul Schultz (1998), Chotikapanich, Valenzuela and Rao (1997), Korzeniewick and Moran (1997), and Firebaugh (1999). They deal either with international inequality (inequality between mean countries' incomes where importance of each country is weighted by its population), or try to approximate world inequality assuming that each country displays a log-normal distribution of income.

Once we consider the world as unit of observation, we can immediately ask the following question: does world distribution also exhibit certain features familiar from our study of individual countries' distributions? Who are the world's rich, and poor? Is there world's middle class? Can we partition the world by countries and still obtain a reasonably good approximation of its "true" inequality obtained by treating all individuals equally regardless of where they live? Are continents good candidates for such partitioning since (e.g.) most of Africa is poor, most of Western Europe is rich etc.? These are the questions we address in this paper. In Section 2 we describe the data we use. In Section 3, we review the Gini decomposition methodology, due to Yitzhaki (1994), which dispenses with the problem of non-exact decomposition of the Gini by recipients. Section 4 decomposes world inequality by continents. Section 5 does the same

thing for continents themselves: it decomposes each continent's inequality by countries in an effort to establish how homogeneous or heterogeneous the continents are. Section 6 partitions the globe into three familiar "worlds": the first world of the rich OECD countries, the second world of the middle class which includes all countries with mean income levels between Brazil and Italy, and the Third world of the poor. Section 7 concludes the paper.

**Section 2: Description of the data**

The data used in this paper are the same data used by Milanovic (1999) in the first derivation of world income distribution based on national households surveys alone. The sources, drawbacks and advantages of the database are explained in detail in Milanovic (1999; Annex 1). Here, we shall only briefly describe some of the key data characteristics.

We use here only the data for the year 1993 (Milanovic derives world income distribution for two years, 1988 and 1993). They cover 114 countries (see Table 1). For most of the countries, the distribution data are presented in the form of mean per capita income by deciles (10 data points). In a number of countries, however, since we had access to the individual-level data, we decided to use a finer disaggregation than decile, e.g. to use 12, 15 or 20 income groups. Individuals are always ranked by household per capita income. The preferred welfare concept is net (disposable) income, or expenditures. However, in many cases, particularly for poorer countries where direct taxes are minimal, we use gross income. In these cases, there is practically no difference between net and gross income.

The data for all countries come from nationally-representative household surveys. There are only three exceptions to this rule: the data from Argentina, El Salvador, and

Uruguay are representative of the urban areas only, and thus in the calculation and decomposition of inequality, these countries' population includes only urban population. About ¾ of the country data used in the study are calculated from individual (unit record) data.

**Table 1. Countries included in the study**

Western Europe (23)
Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Luxembourg, Netherlands, Norway, New Zealand, Portugal, Sweden, Switzerland, U.K., USA, Turkey.

Latin America and Caribbean (19)
Argentina(urb), Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador(urb), Honduras, Jamaica, Mexico, Panama, Paraguay, Venezuela, Ecuador, Uruguay (urb), Peru, Guyana, Nicaragua.

Eastern Europe(23)
Armenia, Bulgaria, Czech Republic, East Germany, Georgia, Slovak Republic, Hungary, Poland, Romania, Belarus, Estonia, Kazakhstan, Kyrgyz Rep., Latvia, Lithuania, Moldova, Russia, Turkmenistan, Ukraine, Uzbekistan, FR Yugoslavia, Slovenia, Albania.

Asia (20)
Bangladesh, China, Hong Kong, India, Indonesia Japan, Jordan, Korea South, Malaysia, Pakistan, Philippines, Taiwan, Thailand, Laos, Mongolia, Nepal, Papua New Guinea, Singapore, Vietnam, Yemen Rep.

Africa (28)
Algeria, Egypt, Ghana, Ivory Coast, Lesotho, Madagascar, Morocco, Nigeria, Senegal, Tunisia, Uganda, Zambia, Bissau, Burkina, Djibouti, Ethiopia, Gambia, Guinea, Kenya, Mali, Mauritania, Namibia, Niger, RCA, South Africa, Swaziland, Tanzania.

*Total: 114*

All the countries are divided into five geographical regions: Africa, Asia, Eastern Europe and the former Soviet Union (transition economies), Latin America and the Caribbean (LAC), and Western Europe, North America and Oceania (WENAO). We choose these five groups because they represent the "natural" economico-political groupings which by being either geographically or politically and economically close share many common characteristics Three continents (Africa, Latin America and the Caribbean, Europe and the former Soviet Union) correspond to the regional classification

used by the World Bank. WENAO is equivalent to the "old" OECD (before the recent expansion of the organization) short of Japan.

The countries included represent 5 billion people, or 91 percent of estimated world population in 1993. The total current dollar GDP of the countries covered is about 95 percent of current dollar world GDP (see Table 2).

Table 2. Data coverage of population and GDP

| | Total population (million) | Population included in the survey (million) | Coverage of population (in %) | Coverage of GDP (in %) |
|---|---|---|---|---|
| Africa | 672 | 503 | 74.8 | 89.2 |
| Asia | 3206 | 2984 | 93.1 | 91.3 |
| E. Europe/FSU | 411 | 391 | 95.2 | 96.3 |
| LAC | 462 | 423 | 91.6 | 92.5 |
| WENAO | 755 | 716 | 94.8 | 96.4 |
| *World* | 5506 | 5017 | 91.1 | 94.7 |

WENAO and Eastern Europe/FSU are covered almost in full (95 percent of the population; 96 percent of GDP). Asia and LAC are covered slightly above 90 percent, both in terms of population and GDP. Finally, Africa's coverage is almost 90 percent in terms of GDP and 75 percent in terms of population.

What are the most important data problems? Other than the issue of differential reliability (quality) of individual country surveys which we lack information to correct for, the main problem is the mixing of income and expenditures. This was unavoidable—if we want to cover the entire world—because countries generally tend to collect either income or expenditures survey data. Most of the survey data in Africa and Asia are expenditure-based; on the other hand, in WENAO, Eastern Europe/FSU, and Latin American countries, almost all surveys are income-based (Table 3).

Table 3. Welfare indicators used in surveys: income or expenditures (number of countries), 1993

| | *Income* | *Expenditure* |
|---|---|---|
| Africa | 2 | 26 |
| Asia | 8 | 10 |
| Eastern Europe | 19 | 3 |
| LAC | 16 | 3 |
| WENAO | 23 | 0 |
| World | 68 | 42 |

Another problem is the use of a single PPP exchange rate for the whole country even when regional price differences may be large. This is particularly a problem in the case of large and populous countries like China, India, Indonesia and Russia which are, economically-speaking, not well integrated into a single national market, and where prices may differ significantly between the regions. Since these countries, because of their large populations, strongly influence the shape of overall world distribution, small errors in the estimates of their PPPs may produce large effects on the calculated world inequality. There is no adjustment, however, that one can in an *ad hoc* fashion apply to the purchasing power exchange rates generated by the International comparison project. In principle, these rates are based on direct price comparisons in 1993, which is one of the reasons why we benchmarked the calculation of world income distribution precisely at 1993.

## Section 3: The Main Properties of the Decomposition of the Gini Index

This section describes the main properties of the decomposition of Gini index according to sub-populations. The decomposition we follow is the one presented in Yitzhaki (1994).

Let $y_i$, $F_i(y)$, $f_i(y)$, $\mu_i$, $p_i$ represent the income, cumulative distribution, the density function, the expected value, and the share of group *i* in the overall population, respectively. [2] The world population, is composed of groups, (i.e., regions, countries) so that the union of populations of all countries makes the world population, $Y_w = Y_1 U Y_2 U,...,U Y_n$, where subscript *w* denotes world and *i* group. Let $s_i = p_i \mu_i / \mu_w$ denote the share of group *i* in the overall income.

Note that

$$F_w(y) = \sum_i p_i F_i(y) \qquad (1)$$

That is, the cumulative distribution of the world is the weighted average of the distributions of the groups, weighted by the relative size of the population in each group. The formula of the Gini used in this paper is (Lerman and Yitzhaki (1989)):

$$G = \frac{2\,\mathrm{cov}(y, F(y))}{\mu} \qquad (2)$$

which is twice the covariance between the income y and the rank F(y) standardized by mean income $\mu$. The Gini of the world, $G_w$, can be decomposed as:

$$G_w = \sum_{i=1}^{n} s_i G_i O_i + G_b \ , \qquad (3)$$

[2] In the sample, the cumulative distribution is estimated by the rank, normalized to be between zero and one, of the observation.

where $O_i$ is the overlapping index of group *i* with the world's distribution (explained below), and $G_b$ is between group inequality. The world Gini is thus exactly decomposed into two components: the between group inequality ($G_b$), and a term that is the sum of the products of income shares, Ginis and overlaps for all groups.

The between group inequality $G_b$ is defined in Yitzhaki and Lerman (1991) as:

$$Gb = \frac{2\,\mathrm{cov}\left(\mu i, \overline{F}_{wi}\right)}{\mu w} \qquad (4)$$

$G_b$ is twice the covariance between the mean income of each group and its mean rank in the overall population of the world ($\overline{F}_{wi}$), divided by overall mean income. That is, each group is represented by its mean income, and the average of the ranks of its members in the world distribution. The term $G_b$ equals zero if either average income or average rank, are equal in all countries. In extreme cases, $G_b$ can be negative, when the mean income is negatively correlated with mean rank.

This definition of between group inequality differs from the one used by Pyatt (1976), Mookherjee and Shorrocks (1982), Shorrocks (1984) and Silber (1989). In their definition, the between-groups is based on the covariance between mean income and the rank of mean income. The difference in the two definitions is in the rank that is used to represent the group: under Pyatt's approach it is the rank of the mean income of the country, while under Yitzhaki-Lerman it is the mean of the ranks of all members (citizens of a country). These two approaches yield the same ranking if all the individuals have the same (average) income. Denote the Pyatt between-group as $G_p$. Then it can be shown that:

$$G_b \leq G_p \qquad (5)$$

The upper limit is reached, and (5) holds as an equality, if the ranges of incomes that groups occupy do not overlap. We will return to this point, following the interpretation of

the overlapping term.

Overlapping is interpreted as the inverse of stratification. Stratification is defined by Lasswell (1965, p.10) as:

"In its general meaning, a stratum is a horizontal layer, usually thought of as between, above or below other such layers or strata. Stratification is the process of forming observable layers, or the state of being comprised of layers. Social stratification suggest a model in which the mass of society is constructed of layer upon layer of congealed population qualities."

According to Lasswell, perfect stratification occurs when the observations of each group (e. g. country) are confined to a specific range, and the ranges of groups do not overlap. Stratification plays an important role in the theory of relative deprivation (Runciman (1966)), which argues that stratified societies can tolerate greater inequalities than non-stratified ones (Yitzhaki (1982)).

Formally, overlapping of each group is defined as:

$$O_i = O_{wi} = \frac{\mathrm{cov}_i(y, F_w(y))}{\mathrm{cov}_i(y, F_i(y))}\ , \tag{6}$$

where, for convenience, the index w is omitted and $\mathrm{cov}_i$ means that the covariance is according to distribution *i*, i.e.

$$\mathrm{cov}_i(y, F_w(y)) = \int (y - \mu_i)\,(F_w(y) - \overline{F}_{wi})\, f_i(y)dy\ , \tag{7}$$

where $\overline{F}_{wi}$ is the average rank in group *i* in the world (all people in group *i* are assigned their world income rank and $\overline{F}_{wi}$ represents the mean value). The overlapping (6) can be further decomposed to identify the contribution of each group that composes the world distribution. In other words, total overlapping of group *i*, $O_i$, is composed of overlapping of *i* with all other groups, including group *i* itself. This further decomposition of $O_i$ is:[3]

[3] The proofs are in Yitzhaki (1994).

$$O_i = \sum_j p_j O_{ji} = p_i O_{ii} + \sum_{j \neq i} p_j O_{ji} = p_i + \sum_{j \neq i} p_j O_{ji} \qquad (8)$$

where $O_{ji} = \frac{\mathrm{cov}_i(y, F_j(y))}{\mathrm{cov}_i(y, F_i(y))}$, is the overlapping of group *j* by group *i*.

The properties of the overlapping index $O_{ji}$ are the following:

(a) $O_{ji} \geq 0$. The index is equal to zero if no member of the *j* distribution is in the range of distribution *i*. (i.e., group *i* is a perfect stratum).[4]

(b) $O_{ji}$ is an increasing function of the fraction of group j that is located in the range of group i.

(c) For a given fraction of distribution j that is in the range of distribution *i*, the closer the observations belonging to *j* to the mean of group *i* the higher $O_{ji}$.

(d) If the distribution of group *j* is identical to the distribution of group *i*, then $O_{ji}=1$. Note that by definition $O_{ii}=1$. This result explains the second equality in (8). Using (8), it is easy to see that $O_i \geq p_i$ , a result to be borne in mind when comparing different overlapping indices of groups with different size.

(e) $O_{ji} \leq 2$. That is, $O_{ji}$ is bounded from above by 2. This maximum value will be reached if all observations belonging to distribution *j* are concentrated at the mean of distribution *i*. Note, however, that if distribution *i* is given then it may be that the upper limit is lower than 2 (see, Schechtman, 2000). That is, if we confine distribution *i* to be of a specific type, such as normal, then it may be that the upper bound will be lower than 2, depending on the assumption on the distribution.

[4] If incomes of all individuals from group *j* are higher than incomes of all individuals belonging to group *i*, then $F_j(y)=1$ for all *j*, and thus $O_{ji}=0$.

(f) In general, the higher the overlapping index $O_{ji}$ the lower will be $O_{ij}$. That is, the more group *j* is included in the range of distribution *i*, the less distribution *j* is expected to be included in the range of *i*.

Properties (a) to (f) show that $O_{ji}$ is an index that measures the extent to which group j is included in the range of group i. Note that the indices $O_{ji}$ and $O_{ij}$ are not related to each other by a simple relationship. It is clear that the indices of overlapping are not independent. To see this, consider two countries with similar income levels but different inequalities. Let us take Mexico, *i*, and Czechoslovakia (under socialism), *j*. Mexico's Gini was around 50, Czechoslovakia slightly over 20. There are many rich and many poor people in Mexico, while the range of people's incomes in Czechoslovakia was very narrow. Consequently, almost (or maybe all) Czechoslovak citizens will be contained within the wide income range of Mexico, while relatively few Mexican citizens will be contained within the narrow income range of Czechoslovakia ($O_{ij} > O_{ji}$).

To see the impact of an increase in overlapping on the decomposition of Gini it is convenient to start with between-group inequality. As we have mentioned above (Eq. 5) $G_p$ is the upper limit for $G_b$ and it is reached if groups are perfectly stratified, i.e., $O_i = p_i$ for all *i*. In this case, the rank of the mean income of the group is identical to the average rank of incomes in each group. Overlapping will cause those two terms to deviate from each other, leading to a lower correlation between mean income and mean rank, and this decreases the between-group component. Therefore, one can use the ratio of $G_b / G_p$ as an index indicating the loss of between group inequality due to overlapping. Since the distribution of world income is given, and the Gini and mean income of each country are given, an increase in between group inequality must be associated with a decrease of the overlapping component, and we can therefore view the overlapping indices as indicating

the quality of the variable used (e. g., country, region) to decompose the world inequality. Our objective in this paper is to show how this stratification-based Gini decomposition adds an entirely new dimension both to our understanding of inequality, and to the conclusions that one might draw.

**Section 4: Decomposition of World Inequality by Continents**

World inequality can be decomposed by countries or by other grouping such as regions. Since there are more than 100 countries in the data it is convenient to perform the decomposition using groups of countries. Consider first the following five regions which, for convenience, we call continents even if all of them are not so geographically: Africa, Asia, Eastern Europe and the former Soviet Union, Latin America and the Caribbean (LAC), and Western Europe, North America and Oceania (WENAO).

Table 1 presents the decomposition of the Gini of the world in 1993. Overall Gini is 0.66 which is high by any standard. To get a grasp of the implication of such a coefficient it is worth to compare it to a Gini of an easy-to-remember distribution. Consider a distribution where 66 percent of the population has zero income, and all income is equally divided among the rest. This is a distribution with a Gini of 0.66. Between Group Gini is 0.31 which is less than a half of the world Gini. Average income per capita is $PPP 3031.8 (in international dollars of the year 1993).

Table 1: Gini decomposition of world inequality by continents

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Continent | Population share (pi) | Mean income in $PPP (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlap component (Oi) |
| Africa | 0.100 | 1310.0 | 0.407 | 0.521 | 0.921 |
| Asia | 0.595 | 1594.6 | 0.397 | 0.615 | 1.037 |
| Eastern Europe and FSU | 0.078 | 2780.9 | 0.609 | 0.465 | 0.721 |
| Latin America and Carab. | 0.084 | 3639.8 | 0.629 | 0.555 | 0.742 |
| WENAO | 0.143 | 10012.4 | 0.861 | 0.394 | 0.346 |
| Total | 1 | 3031.8 | 0.5 | 0.659 | --- |
| | | | | | |
| Between group | | | | 0.309 (47%) | |
| Within group $\sum_i siGiOi$ | | | | 0.350 (53%) | |
| Overall Gini | | | | 0.659 | |

Note: Percentage contributions to overall Gini given between brackets.

The first column presents the share of each group in the population of the world, the second column presents continent's mean income per capita, the third the average ranking of the people in the continent in the world (e.g. the mean rank of Africans is $40.7^{th}$ percentile); the forth column presents the Gini coefficient of the continent, and the fifth the overlapping coefficient between this group and the rest of the world. Value of $P_i$ for the overlap coefficient means it forms a perfect strata, 1 indicates that continent's distribution mimics the distribution function of the world, while an overlapping index which is approaching 2 means that the continent is heterogeneous with respect to the world. It breaks into two separate stratas, one richer and the other poorer than the world.

We focus on the last column. Asia is not a homogeneous group with respect to the world distribution. It has the highest inequality (which is almost equal to world inequality) and has an overlapping index slightly higher than one, which means that it is

not a stratified group with respect to the world. Its distribution follows very closely world distribution. This result is not surprising if we consider having Japan and China in the same continent. African distribution is also close to that of the world. LAC and Eastern Europe/ FSU distributions show certain similarities: in both the mean ranks and the overlap components are very close although LAC is somewhat richer. Finally, WENAO, as we would expect, has a very low overlap component. It almost forms a stratum (for the sake of convenience, we shall consider each grouping to represent a stratum if its $O_{ji}$ component is less than 0.3, provided of course, that the lower bound, (population share) is not close to this number).

Between-continent inequality Gini is 0.309, which is less than half of the inequality in the world. Had we used Pyatt's between-group component, we would have gotten a between-continent Gini of 0.398, which means that overlapping of incomes has decreased between-continent components by about 9 Gini points, and increased the intra-group component from 0.26 to 0.35.

Table 2 presents the decomposition according to equation 3 of the intra-group term $\sum_i siGiOi$. Column 4 shows the product of income share, overlap component, and Gini coefficient for each continent. The sum of such products across all continents gives the within-group term in equation 3. (Note that the sum of column 4 here is equal to the total within component from Table 1.)

Table 2: Contribution of each continent to overall inequality

| | (1) | (2) | (3) | (4) | (5) | (6)=(5)/(1) |
|---|---|---|---|---|---|---|
| | Income share (si) | Overlap component (Oi) | Gini (Gi) | *siOiGi* | Share of total intra-group inequality | |
| Africa | 0.0433 | 0.921 | 0.521 | 0.0208 | 0.059 | 1.4 |
| Asia | 0.3128 | 1.037 | 0.6149 | 0.1994 | 0.570 | 1.8 |
| Eastern Europe and FSU | 0.0715 | 0.721 | 0.465 | 0.024 | 0.069 | 1.0 |
| LAC | 0.1013 | 0.742 | 0.5549 | 0.0417 | 0.119 | 1.2 |
| WENAO | 0.4711 | 0.346 | 0.3944 | 0.0642 | 0.183 | 0.4 |
| Total | 1 | 0.5 | 0.659 | 0.350 | 1 | 1 |

We note that Africa with 4 percent of the world income, and with high overlap and Gini components is responsible for 2.08 Gini points. This implies almost 6 percent of intra-group inequality (intra-group inequality is 0.35). Asia, on the other hand has 31 percent of world income, high overlap component, high Gini and therefore contributes very high 19.94 Gini points. It thus accounts for the lion's share of intra-group inequality—57 percent. LAC and the Eastern Europe/FSU represent more homogeneous groups, and their percentage intra-group contributions are similar to their relative share in income (see column 6), while WENAO represents the most homogeneous group. Despite its total income accounting for almost ½ of world income, WENAO exhibits low inequality and low overlapping with the rest of the world so that its contribution to world inequality is only 6.4 Gini points. Looking at these numbers only, we can already see that Asia is the most important contributor to world inequality: it contributes some 20 Gini points which is almost 1/3 of total world inequality, and 57 percent of intra-continent inequality. At the other extreme are the rich WENAO countries whose contribution to world inequality falls short of their share in world income (see value of 0.4 in column 6 Table 2).

*Overlapping between the continents*

Table 3 presents the overlapping matrix between continents. The rows in Table 3 represent the continent whose distribution is used as the base distribution. When Africa is used as the base, then only WENAO forms a distinct group. When WENAO is used as a base, both Africa and Asia, with overlapping indexes of 0.186 and 0.182 respectively, are shown to have almost nothing in common with the advanced economies. The interpretation of the two overlapping indices is, that there are relatively more citizens of Europe, North America and Oceania in the range of Africa's distribution (i.e., poor), than there are Africans or Asians in the range of WENAO distribution. (We guess that it is not surprising.) This is even more in evidence when we compare Asia and WENAO. With Asia used as the base, the overlap index with WENAO is 0.97; but with WENAO region used as a base, there are only very few percents of Asians who fall in the income range characteristic for the developed countries (the overlap index is 0.182).

Table 3: Overlapping between continents

| | Africa | Asia | Eastern Europe and FSU | LAC | WENAO |
|---|---|---|---|---|---|
| Africa | 1 | 0.995 | 0.998 | 0.974 | 0.485 |
| Asia | 1.030 | 1 | 1.251 | 1.22 | 0.970 |
| Eastern Europe and FSU | 0.749 | 0.668 | 1 | 0.948 | 0.634 |
| Latin America | 0.672 | 0.599 | 1.042 | 1 | 1.069 |
| WENAO | 0.186 | 0.182 | 0.466 | 0.469 | 1 |

Table 4 presents the average ranking of members of one group in terms of the other. The diagonal presents each group in its own ranking which is 0.5 by definition. The average ranking, unlike mean income, is not sensitive to extreme observations. An

average ranking above 0.5 means that, on average, people in a given region have higher ranks in the world than in their own distribution—they are a richer group. For example, a person who is relatively poor in America (and hence has a low income rank) will be relatively rich in a world ranking. The average ranking of an African individual in terms of a Europeans/North Americans is 0.05 which means that an average African is in the middle of the lowest European/North American decile. Since the rankings of Europeans/North Americans in terms of Africans and the Africans in terms of Europeans/North Americans add up to one, this implies that the average ranking of Europeans/North Americans in terms of the African distribution is 0.95. That is, on average, citizens of WENAO are in the middle of the top decile in Africa.

Table 4: The ranking of one distribution in terms of another

| | The yardstick distribution | | | | |
|---|---|---|---|---|---|
| | Africa | Asia | Eastern Europe and the FSU | LAC | WENAO |
| Africa | 0.5 | 0.515 | 0.275 | 0.261 | 0.049 |
| Asia | 0.485 | 0.5 | 0.265 | 0.247 | 0.064 |
| Eastern Europe and the FSU | 0.725 | 0.735 | 0.5 | 0.483 | 0.136 |
| LAC | 0.739 | 0.753 | 0.517 | 0.5 | 0.172 |
| WENAO | 0.951 | 0.936 | 0.864 | 0.828 | 0.5 |

Africa continues to be ranked low if we compare it to transition economies or Latin America, making it only slightly above the 25$^{th}$ percentile, but it fares pretty well with respect to Asia. That is, using the average rank as the indicator of average well being, Africa's position is a bit higher than Asia's. This could have been observed from Table 1 where the average income in Africa is shown as lower than the average income in Asia but, on the other hand, the average ranking of Africans is a bit higher than the average ranking of Asians. This is the result of several Asian countries with high income that are

making Asia's average income higher than Africa's average income, although (mostly rural) masses in India, China, Indonesia, Bangladesh have very low ranks in world income distribution.

**Section 5: Decomposition of the Continents' Distributions by Countries**

In the previous section, we have looked at the decomposition of world inequality by continents. But exactly the same decomposition could be now carried a step further. In this section we decompose the inequality in each continent according to countries. We start with the poorest region: Africa.

*Inequality in Africa*

The average income in Africa is $PPP 1310 per capita per year, which is the lowest among continents. Although the mean income is low, overall inequality is high, with the continent-wide Gini equal to 0.521. Between group inequality is 0.203, which implies that the difference in countries are mild relative to distributions in the countries, because between country inequality explains less than 40 percent of overall inequality. Pyatt's between group inequality is 0.333 which implies that between-country inequality has declined to about 60 percent of its maximum value due to overlapping.

Table 5 is identical to Table 1 in its structure. The poorest country in Africa is Zambia, and the richest is Swaziland. One interesting property of Africa is that inequality is relatively high in many countries, and that the overlapping indexes with respect to the whole distribution of the continent are also relatively high. The implication of the latter finding is that there is a fair amount of homogeneity among African countries.

Consider now the countries with high inequality (Gini above 0.5) and high overlapping (overlapping index above 1).[5] They can potentially be prone to political instability—ignoring of course other potential sources of instability like ethnic or religious fractionalization.[6] There are six such countries in Africa: Senegal, Central African Republic, Lesotho, Kenya, Guinea Bissau, and Namibia. Differently, if we concentrate only on the countries with a low overlapping index (less than 0.3), there is no such a country in Africa. In other words, Africa is a fairly homogeneous continent with no single country representing a stratum.

[5] We choose overlapping index greater than unity because it indicates that the variance of countries ranks is greater when assessed in the all African context than within itself (the ranks are distributed uniformly from 0 to 1 in the latter case).

[6] Instability is defined with respect to the distribution of the region, because we believe that this is the reference group people are most familiar with. The alternative view is to use the world as a reference group. This is done in the appendix. Relative deprivation theory (Runciman, 1966) predicts that instability is a function of inequality, prestige and power. We are only dealing with one component of the theory. Yitzhaki (1982) provides a connection between relative deprivation and the Gini coefficient.

Table 5. Inequality in Africa According to Countries

| | Population share (pi) | Mean Income (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlapping index (Oi) |
|---|---|---|---|---|---|
| Zambia | 0.018 | 316.30 | 0.165 | 0.513 | 0.829 |
| Madagascar | 0.028 | 361.50 | 0.192 | 0.445 | 0.82 |
| Mali | 0.020 | 452.70 | 0.226 | 0.488 | 0.986 |
| Burkina | 0.019 | 468.50 | 0.238 | 0.466 | 0.977 |
| Senegal | 0.016 | 509.70 | 0.253 | 0.519 | 1.051 |
| Central Af. Rep. | 0.006 | 512.10 | 0.237 | 0.595 | 1.165 |
| Gambia | 0.002 | 521.80 | 0.275 | 0.463 | 0.975 |
| Niger | 0.016 | 611.55 | 0.341 | 0.354 | 0.796 |
| Uganda | 0.040 | 622.30 | 0.34 | 0.38 | 0.861 |
| Ethiopia | 0.113 | 737.80 | 0.391 | 0.385 | 0.895 |
| Nigeria | 0.209 | 752.06 | 0.382 | 0.441 | 0.946 |
| Ivory Coast | 0.026 | 878.20 | 0.459 | 0.36 | 0.842 |
| Lesotho | 0.004 | 901.20 | 0.368 | 0.565 | 1.162 |
| Tanzania | 0.056 | 1036.90 | 0.511 | 0.363 | 0.809 |
| Kenya | 0.056 | 1146.90 | 0.42 | 0.572 | 1.147 |
| Mauritania | 0.004 | 1505.70 | 0.62 | 0.38 | 0.741 |
| Guinea | 0.013 | 1508.30 | 0.612 | 0.395 | 0.734 |
| Guinea-Bissau | 0.002 | 1531.00 | 0.526 | 0.545 | 1.048 |
| Ghana | 0.033 | 1663.60 | 0.682 | 0.33 | 0.604 |
| Egypt | 0.112 | 1896.84 | 0.751 | 0.265 | 0.449 |
| Djibouti | 0.001 | 1964.00 | 0.700 | 0.390 | 0.662 |
| Tunisia | 0.017 | 2176.70 | 0.759 | 0.325 | 0.545 |
| Morocco | 0.052 | 2276.08 | 0.747 | 0.362 | 0.592 |
| Algeria | 0.053 | 2454.60 | 0.780 | 0.346 | 0.515 |
| South Africa | 0.079 | 3035.60 | 0.670 | 0.577 | 0.798 |
| Namibia | 0.003 | 3254.20 | 0.542 | 0.707 | 1.047 |
| Swaziland | 0.002 | 3876.70 | 0.731 | 0.58 | 0.672 |
| *Africa* | *1* | *1310* | *0.5* | *0.521* | -- |
| | | | | | |
| Between country Gini | | | | 0.203 (39%) | |
| Within country Gini $\sum_i SiGiOi$ | | | | 0.318 (61%) | |

*Inequality in Asia*

The average income is $PPP1,595 per capita per year. The overall inequality (Gini) in Asia is 0.615, while between country inequality is 0.445 which is twice as high as the between country inequality in Africa. The Pyatt between-group component is 0.502 so that between group inequality is about 90 percent of its upper bound. The fact that the between-country inequality in Asia accounts for higher share of overall inequality than that in Africa implies that Asia is a more stratified continent, according to countries, than Africa (see Table 6). One possible technical explanation for this result is that two countries, China and India account for seventy percent of the population, so that one can be led to the conclusion that the rest of the countries do not have any significant effect on the distribution. But, those two countries have relatively low inequality and the difference in mean income of those two countries is relatively small, so that inequality in the combined population of these two countries cannot be very high.[7] Therefore, the high inequality must originate from the incomes of other countries. Note that richest seven countries in Asia all have the overlapping index less than 0.3, a number that no country in Africa is even close to. Japan, Taiwan, and South Korea which have low inequality and high income clearly form distinct stratas in Asia (the overlap index for each of them is very low—under 0.1). Note also that the average rank of these countries' population in Asia exceeds the 95$^{th}$ percentile. It is also interesting to observe that Hong Kong, the "country" with the highest per capita income in Asia has, because of high inequality, a larger overlap component than Japan, Taiwan and South Korea. Overall, intra-country in Asia is much lower than intra-country inequality in Africa (28 percent of total inequality vs. 61 percent in Africa), so that the difference in Asia is more among countries while in

Africa the differences are more inside the countries. The only country with overlapping greater than one is Nepal, which is the third most unequal country in Asia. There is no single country with a Gini coefficient above 0.5.

Table 6. The Decomposition of Inequality in Asia, according to countries

| | Population share (pi) | Mean Income (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlapping Index (Oi) |
|---|---|---|---|---|---|
| India | 0.302 | 523.68 | 0.295 | 0.328 | 0.911 |
| Mongolia | 0.001 | 610.39 | 0.368 | 0.312 | 0.829 |
| Nepal | 0.006 | 643.40 | 0.321 | 0.438 | 1.077 |
| Bangladesh | 0.039 | 705.91 | 0.44 | 0.281 | 0.767 |
| Pakistan | 0.041 | 798.20 | 0.485 | 0.299 | 0.764 |
| Vietnam | 0.024 | 805.50 | 0.473 | 0.328 | 0.819 |
| Indonesia | 0.063 | 884.08 | 0.508 | 0.319 | 0.770 |
| Laos | 0.002 | 945.10 | 0.552 | 0.295 | 0.692 |
| China | 0.401 | 1121.86 | 0.563 | 0.381 | 0.811 |
| Philippines | 0.022 | 1236.35 | 0.572 | 0.426 | 0.814 |
| Papua New G | 0.001 | 1743.00 | 0.737 | 0.326 | 0.512 |
| Thailand | 0.02 | 2000.80 | 0.709 | 0.456 | 0.583 |
| Yemen Repub. | 0.004 | 2360.51 | 0.787 | 0.355 | 0.456 |
| Jordan | 0.002 | 3221.55 | 0.854 | 0.352 | 0.280 |
| Malaysia | 0.007 | 5583.30 | 0.887 | 0.463 | 0.252 |
| Singapore | 0.001 | 7431.20 | 0.929 | 0.417 | 0.157 |
| Taiwan | 0.007 | 8866.70 | 0.954 | 0.293 | 0.083 |
| South Korea | 0.015 | 9665.90 | 0.956 | 0.31 | 0.093 |
| Japan | 0.042 | 11667.82 | 0.969 | 0.243 | 0.066 |
| Hong Kong | 0.002 | 12934.80 | 0.95 | 0.497 | 0.119 |
| *Asia* | *1* | *1595* | *0.5* | *0.615* | --- |
| | | | | | |
| Between country Gini | | | | 0.445 (72%) | |
| Within country Gini $\sum_i SiGiOi$ | | | | 0.170 (28%) | |

[7] The Gini index for India and China (combined) is 0.4128, with between group inequality being 0.09.

*Inequality in transition economies*

The mean income in the transition countries of Eastern Europe and the former Soviet Union countries is $PPP 2,781. Overall inequality is 0.465, which is relatively high, and between-group inequality is 0.180 which is around 40 percent of overall inequality. Thus the region seems to display about the same degree of homogeneity as Africa where between group Gini is 0.20 and its contribution to total inequality is also around 40 percent. Pyatt's between-country inequality is 0.266 so that between-group inequality is about 68 percent of its upper bound.

Similar to Asia, however, is the fact that the overlapping index of all countries is less than one, with only five countries with relatively high overlapping (above 0.8): Ukraine, Yugoslavia (Serbia and Montenegro), Estonia, Lithuania and Russia. Also, no country displays a Gini in excess of 0.5—again a feature similar to Asia. The two poorest countries, Georgia and Uzbekistan have low inequality and form the strata (overlapping index less than 0.3).

Table 7. The decomposition of inequality in transition countries, according to countries

| | Population share (pi) | Mean Income (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlapping Index (Oi) |
|---|---|---|---|---|---|
| Georgia | 0.014 | 264 | 0.05 | 0.243 | 0.18 |
| Uzbekistan | 0.056 | 344 | 0.07 | 0.331 | 0.25 |
| Armenia | 0.009 | 367 | 0.08 | 0.431 | 0.36 |
| Kyrgyz Rep. | 0.012 | 397 | 0.09 | 0.428 | 0.35 |
| Kazakhstan | 0.042 | 637 | 0.16 | 0.318 | 0.43 |
| Turkmenistan. | 0.011 | 1095 | 0.27 | 0.351 | 0.65 |
| Albania | 0.009 | 1293 | 0.32 | 0.286 | 0.55 |
| Moldova | 0.011 | 1333 | 0.32 | 0.372 | 0.74 |
| Romania | 0.058 | 1641 | 0.38 | 0.321 | 0.72 |
| Belarus | 0.027 | 2045 | 0.47 | 0.282 | 0.69 |
| Ukraine | 0.133 | 2053 | 0.42 | 0.428 | 0.93 |
| Latvia | 0.007 | 2312 | 0.51 | 0.279 | 0.67 |
| Poland | 0.098 | 2378 | 0.52 | 0.282 | 0.69 |
| FR Yugoslavia | 0.027 | 2634 | 0.48 | 0.438 | 0.94 |
| Estonia | 0.004 | 2634 | 0.51 | 0.383 | 0.87 |
| Lithuania | 0.010 | 2818 | 0.55 | 0.369 | 0.84 |
| Hungary | 0.026 | 2971 | 0.62 | 0.225 | 0.55 |
| Bulgaria | 0.022 | 3161 | 0.60 | 0.334 | 0.77 |
| Slovak Rep. | 0.014 | 3712 | 0.73 | 0.178 | 0.38 |
| Russia | 0.379 | 4114 | 0.66 | 0.393 | 0.82 |
| Slovenia | 0.005 | 4616 | 0.77 | 0.239 | 0.47 |
| Czech Rep. | 0.026 | 4678 | 0.78 | 0.216 | 0.38 |
| *Transition countries* | *1* | *2781* | *0.5* | *0.465* | -- |
| | | | | | |
| Between country Gini | | | | 0.180 (39%) | |
| Within country Gini $\sum_i siGiOi$ | | | | 0.285 (61%) | |

*Inequality in Latin American countries*

Average income is $PPP 3,640 per person per year. As shown in Table 8, overall inequality in Latin America is high (Gini=0.555), with between-country group inequality making less than 10 percent of this number (0.041). So, more than 90 percent of Latin American inequality is explained by inequality within countries. Pyatt's between-country Gini is 0.136 so that even when correcting for the size of the countries, between-group inequality is relatively low. The low between-country income inequality is a hint that in LAC the countries are relatively similar to each other. Latin America forms a very homogeneous region, only slightly less so than the WENAO countries (see below). The great similarity between the countries is shown by the fact that the lowest overlap index still has a relatively high value of 0.73 (Uruguay). Even the richest country's (Chile) overlap index is 0.77 and the mean rank of a Chilean is equal to the 65$^{th}$ Latin American percentile. Compare this with the fact that the mean rank of a Japanese, South Korean or Taiwanese citizen is above the 95$^{th}$ percentile in Asia.

However, because of very high inequality within the countries (no fewer than 10 countries have Ginis above 0.5), we can identify several potentially unstable countries (Gini>0.5 and overlap index>1). They are Honduras, Bolivia, Brazil, Panama and Paraguay.

Table 8. The decomposition of inequality in Latin America and the Caribbean, according to countries

| | Population share (pi) | Mean Income (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlapping Index (Oi) |
|---|---|---|---|---|---|
| El Salvador | 0.006 | 1294.40 | 0.262 | 0.504 | 0.97 |
| Honduras | 0.013 | 1366.10 | 0.258 | 0.546 | 1.09 |
| Peru | 0.053 | 1617.80 | 0.33 | 0.483 | 0.99 |
| Jamaica | 0.006 | 1674.40 | 0.368 | 0.372 | 0.81 |
| Bolivia | 0.019 | 2183.10 | 0.383 | 0.502 | 1.03 |
| Venezuela | 0.049 | 2501.80 | 0.468 | 0.418 | 0.90 |
| Guyana | 0.002 | 2888.50 | 0.463 | 0.49 | 0.96 |
| Ecuador | 0.026 | 3256.30 | 0.554 | 0.407 | 0.79 |
| Costa Rica | 0.007 | 3306.10 | 0.528 | 0.444 | 0.87 |
| Dominican Rep | 0.018 | 3334.90 | 0.523 | 0.468 | 0.89 |
| Brazil | 0.370 | 3472.56 | 0.454 | 0.59 | 1.08 |
| Argentina(Urb) | 0.069 | 3568.00 | 0.536 | 0.496 | 0.94 |
| Panama | 0.006 | 3668.50 | 0.491 | 0.559 | 1.03 |
| Paraguay | 0.011 | 3886.30 | 0.504 | 0.569 | 1.04 |
| Mexico | 0.215 | 4207.60 | 0.564 | 0.519 | 0.93 |
| Nicaragua | 0.010 | 4338.20 | 0.584 | 0.501 | 0.90 |
| Uruguay(urb) | 0.007 | 4504.70 | 0.635 | 0.425 | 0.73 |
| Colombia | 0.080 | 4910.55 | 0.629 | 0.488 | 0.80 |
| Chile | 0.033 | 6475.75 | 0.651 | 0.564 | 0.77 |
| *Latin America* | *1* | *3640* | *0.5* | *0.555* | --- |
| | | | | | |
| Between group Gini | | | | 0.041 (7%) | |
| Within group Gini $\sum_i siGiOi$ | | | | 0.514 (93%) | |

*Inequality in West Europe, North America and Oceania*

This is, of course, the richest region with the mean income of $PPP 10,012 which is three times the mean income in Latin America, the second richest region. Overall inequality is relatively low, 0.394, while between-country inequality is also low 0.069. Pyatt between-group is 0.142 so that between-group inequality is less than 50% from its maximal value. Clearly, we deal with a rich and homogeneous region, in which, more than 80 percent of total inequality is explained by inequality within countries. This last point makes WENAO similar to Latin America with one important difference though: the overall *level* of inequality is much lower in WENAO than in Latin America.

Even the lowest overlap index (in Luxembourg) is relatively high: almost 0.6. Therefore, no country forms a stratum. There is also no country with a Gini index over 0.5; Turkey is the most unequal country with the Gini of 0.45. Several countries, however, have relatively high overlap indexes, above 0.95: Portugal, Australia, UK and the US. For a rich country like the US, an indication that there are many relatively poor Americans;[8] and for a relatively poor country like Portugal, the indication that there are relatively many rich Portuguese.

[8] Note that the US and Denmark have almost the same mean income, but the average income rank of Danish population is almost 9 percentage points higher than the average rank of Americans (66$^{th}$ percentile vs. the 57$^{th}$). This is explained by high inequality in the United States.

Table 9. The decomposition of inequality in WENAO countries, according to countries

| | Population share (pi) | Mean Income (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlapping Index (Oi) |
|---|---|---|---|---|---|
| Turkey | 0.083 | 2578.20 | 0.123 | 0.448 | 0.701 |
| Ireland | 0.005 | 5661.62 | 0.312 | 0.284 | 0.746 |
| Austria | 0.011 | 6313.90 | 0.334 | 0.472 | --- |
| Israel | 0.007 | 6438.10 | 0.344 | 0.347 | 0.914 |
| Portugal | 0.014 | 7469.50 | 0.395 | 0.348 | 0.968 |
| Greece | 0.015 | 7837.40 | 0.425 | 0.32 | 0.880 |
| Italy | 0.080 | 8019.00 | 0.443 | 0.306 | 0.851 |
| Belgium | 0.014 | 8401.30 | 0.479 | 0.246 | 0.753 |
| Australia | 0.025 | 9086.50 | 0.481 | 0.345 | 0.959 |
| U. K. | 0.081 | 9440.00 | 0.485 | 0.354 | 0.957 |
| Sweden | 0.012 | 9451.00 | 0.532 | 0.249 | 0.760 |
| Netherlands | 0.021 | 9625.00 | 0.517 | 0.311 | 0.859 |
| Finland | 0.007 | 10074.90 | 0.565 | 0.226 | 0.679 |
| Cyprus | 0.001 | 10287.60 | 0.546 | 0.297 | 0.846 |
| Germany | 0.113 | 10340.20 | 0.554 | 0.294 | 0.830 |
| France | 0.080 | 10348.50 | 0.54 | 0.326 | 0.863 |
| Norway | 0.006 | 10650.80 | 0.586 | 0.247 | 0.727 |
| Canada | 0.040 | 11674.00 | 0.588 | 0.31 | 0.849 |
| U. S. A. | 0.361 | 12321.40 | 0.574 | 0.394 | 0.980 |
| Denmark | 0.007 | 12371.10 | 0.661 | 0.246 | 0.679 |
| New Zealand | 0.005 | 12648.00 | 0.569 | 0.43 | --- |
| Switzerland | 0.010 | 14068.00 | 0.666 | 0.324 | 0.823 |
| Luxembourg | 0.001 | 15262.10 | 0.730 | 0.264 | 0.597 |
| *WENAO* | *1* | *10012* | *0.5* | *0.394* | -- |
| | | | | | |
| Between country Gini | | | | 0.069 (18%) | |
| Within country Gini $\sum_i siGiOi$ | | | | 0.325 (82%) | |

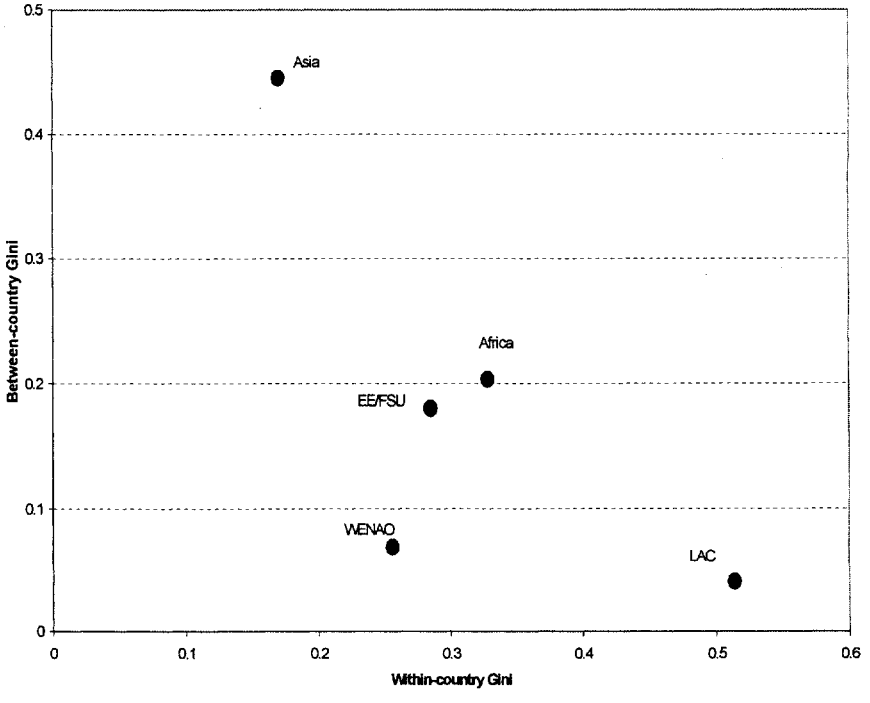
Note: for Austria and New Zealand, the bottom decile's incomes were recorded as zero, and thus the overlap component, probably spuriously, exceeded 1.

Table 10. Summary of results: between and within inequality by continents

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Continent | Gini | Between country Gini | Within-country Gini | Pyatt between country Gini | (2):(4) |
| Africa | 0.531 | 0.203 | 0.328 | 0.333 | 0.61 |
| Asia | 0.615 | 0.445 | 0.170 | 0.502 | 0.89 |
| Eastern Europe/FSU | 0.465 | 0.180 | 0.285 | 0.266 | 0.68 |
| Latin America | 0.555 | 0.041 | 0.514 | 0.136 | 0.30 |
| WENAO | 0.325 | 0.069 | 0.256 | 0.142 | 0.49 |

Table 10 presents summary statistics concerning the between group component. As can be seen, the importance of between group inequality in Asia is high both in absolute amounts (Gini of 0.45) and also with respect to its potential share (89 percent of the between-country component according to the Pyatt decomposition). On the other hand, the between-country inequality in Latin America in both aspects: its extremely low value (Gini of 0.04) and also with respect to its potential share (30 percent; see column 5). Thus Asia and Latin America represents the two antipodes (see Figure 1). Asian continents consists of countries with widely different per capita income levels and moderate within-country inequalities. Latin America is a continent composed of countries with similar per capita incomes but with large within-country inequalities.

Figure 1. Between and within inequality by continents (in Gini points)




**Section 6: The "old fashioned" distribution of the world: First, Second and Third Worlds**

In this section, we abandon the division of the world into continents and divide it instead in five groups: (1) the G-7 group (US, Germany, UK, Japan, France, Canada and Italy); (2) the G-7 income-equivalent which implies an income at least as high as the income of the poorest G-7 country (Italy: $PPP 8000 per capita); (3) China and India as Poor Giants; (4) poor countries, that is those with per capita income less than, or equal to, Brazil ($PPP 3470 per capita), and (5) the world "middle class" composed of countries with income levels between Brazil and Italy.

Table 11. The decomposition of inequality in the world
(new groupings)

| | Population share (pi) | Mean Income (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlapping index (Oi) |
|---|---|---|---|---|---|
| G7 | 0.133 | 11137.7 | 0.892 | 0.347 | 0.25 |
| G7 equivalents | 0.03 | 9940.991 | 0.884 | 0.323 | 0.247 |
| China and India | 0.418 | 864.8181 | 0.345 | 0.413 | 0.799 |
| LDCs | 0.335 | 1403.646 | 0.445 | 0.488 | 0.841 |
| Middle income countries | 0.084 | 5072.251 | 0.735 | 0.478 | 0.544 |
| *World* | *1* | *3031.8* | *0.5* | *0.659* | --- |
| | | | | | |
| Between group Gini | | | | 0.469 (71%) | |
| Within group Gini $\sum_i siGiOi$ | | | | 0.190 (29%) | |

The rich world (G7 and G7 equivalents) covers about 16 percent of world population (see Table 11). (The definition of rich is based, of course, on *mean* country per capita income, not on actual income of the people in a country.) The world middle class is very small: a little over 8 percent of world population. All the rest of the world lives in poor countries: a third of world population in LDCs, and additional 40 percent in the two poor giants, India and China. With this decomposition of the world, more than 70 percent of inequality is explained by between-group differences, only 29 percent by within-group inequalities. This shows first, that with a relatively crude decomposition (based on countries per capita incomes and only five groups), we can account for more than 70 percent of world inequality, and second, that world middle class is very small.

Notice also that only LDCs and the middle class countries have relatively high within-group Ginis (0.48); for the other three groups, Ginis are much less. Finally, the overlap index shows that G7 and G7 equivalents represent a stratum.

The overlapping matrix between the five regions (Table 12) tells a more problematic story. If we use G7 and G7-equivalents as the base, almost no people from LDCs, China and India fall in the income range of the rich countries. G7 and G7-equivalents, however, are very similar. If we use LDCs, or India and China as the base, we see that they are very similar among themselves (overlap indexes over 0.9), and, of course, quite different from the rich countries. This, in turn, implies that an even more meaningful and parsimonious grouping could be a tripartite one: the poor countries (LDCs, China and India; called in the past "The Third World"), the middle-income group, and the rich ("The First World").

Table 12.Overlapping matrix between the regions

| | LDCs | China and India | Middle class | G7 equiv. | G7 |
|---|---|---|---|---|---|
| LDCs | 1 | 0.905 | 0.854 | 0.354 | 0.337 |
| China and India | 0.975 | 1 | 0.495 | 0.067 | 0.081 |
| Middle class | 0.478 | 0.301 | 1 | 1.125 | 1.06 |
| G7 equivalents | 0.099 | 0.036 | 0.492 | 1 | 0.966 |
| G7 | 0.097 | 0.029 | 0.502 | 1.021 | 1 |

The results of the tripartite grouping are shown in Table 13. The first column shows that the Third World accounts for 76 percent of the population but only 29 percent of income, the middle class accounts for 8 percent of population and 12 percent of income, while the developed world accounts for 16 percent of population and 58 percent of income. Simple partition of the world in these three groups would explain 68 percent of world inequality. Now, this is only marginally less than if divided world into countries: as

Appendix 1 shows, with such a decomposition, between-country inequality accounts for 75.6 of world inequality. This illustrated the meaningfulness of the tripartite old-fashioned partition of the world. By moving from 110 countries to only 3 country groups, we "lose" explanation for less than 8 percent of world Gini.

The Gini coefficients of inequality is negatively correlated with income, while the overlapping indices are low, particularly the one for the Rich World. Note that the overlapping index for the Third World cannot be lower than 0.76 and the one for the Rich World cannot be less than 0.16 (their respective population shares). Pyatt's between-group inequality is 0.491, which means that this very crude decomposition into three groups does not suffer from much overlapping because more than 90 percent of between group inequality (0.449 divided by 0.491) is captured by this grouping. In other words, this means that if the world was perfectly stratified into those three groups, than the Gini of the world would have been 0.61 which is not much less than the actual world inequality.

Table 13. World divided into three groups:
the First World, the middle class, and the Third World

| | Population share (pi) | Mean Income (μi) | Mean rank ($\overline{F}_{iw}$) | Gini (Gi) | Overlapping index (Oi) |
|---|---|---|---|---|---|
| Third World (poorer than, or equal to, Brazil) | 0.76 | 1171 | 0.392 | 0.494 | 0.89 |
| Middle class | 0.08 | 4609 | 0.725 | 0.462 | 0.54 |
| First World (equal or richer than Italy) | 0.16 | 10919 | 0.891 | 0.344 | 0.25 |
| *World* | *1* | *3031.8* | *0.5* | *0.659* | --- |
| Between group Gini | | | | 0.449 (68%) | |
| Within group Gini $\sum_i siGiOi$ | | | | 0.210 (32%) | |

The fact that we do not lose much information by dividing the world in the "old-fashioned" way is illustrated also if we divide all the *people* in the world into three groups using the same income per capita thresholds as for the allocation of countries, namely, that poor people in the world are all those (regardless of where they live) with income level equal or less than Brazil's mean per capita income ($PPP 3470),[9] the world middle class are all those with income levels higher than Brazil's and lower than Italy's ($PPP 8,000) mean income, and the rich are all those with annual income above $PPP 8,000. Then it turns out that 78 percent of the world is poor, 11 percent belongs to the middle class, and 11 percent are rich. Any way we slice it, world middle class is very small.

One possible explanation to this result is the one offered by Kopczuk, Slemrod and Yitzhaki (2000), who compared the optimal income tax from a point of view of a world planner, and compared it to an optimal income tax from a decentralized (country-level) point of view. They argue that countries tend to attach extremely higher welfare weights to their own citizen, relative to citizens of other countries. Those weights can be 1 to 1000. This policy implies that rich countries care much more about their own poor, and by this way they shrink the "middle class" of the world.

**Section 7. Conclusions**

When we partition the world into five continents (Africa; Asia; Western Europe, North America and Oceania; Eastern Europe/FSU; and Latin America and the Caribbean), we find that less than one-half of world inequality is explained by differences in incomes between the continents. Therefore, if we look for a more meaningful

[9] This is about $PPP 9½ per person per day, or about equal to the official poverty line in Western Europe

partition—defined as being fairly parsimonious (that is, involving only a few units) and yet being able to explain most of world inequality—we find that the "old fashioned" division of the Earth into three world (first, middle class, and third) "works" much better. The between-group inequality between the "three worlds" explains almost 70 percent of total world inequality. According to this "old fashioned" partition, 76 percent of world population lives in poor countries, 8 lives in middle income countries (defined as countries with per capita income levels between Brazil and Italy), and 16 percent lives in rich countries. Now, if we keep the same income thresholds as implied in the previous division, and look at "true" distribution of *people* according to their income (regardless of where they live), we find a very similar result: 78 percent of the world population is poor, 11 percent belongs to the middle class, and 11 percent are rich.

Thus, world seems—any way we consider it—to lack middle class. It looks like a proverbial hourglass: thick on the bottom, and very thin in the middle. Why the world does not have a middle class? First—an obvious answer—is that it is because world inequality is extremely high. When the Gini coefficient is 66, higher than the Gini coefficient of South Africa and Brazil, it is simply numerically impossible to have a middle class. [10] But what may be a substantive cause for the absence of the middle class? We conjuncture that this is because national authorities care about their own first and foremost. They heavily discount, or do not care, about the poverty of others, perhaps because foreigners are not their voters, or because of both psychological and physical distance between people in different countries. Poor Dutch are unlikely to be poor at the world level; their government will make sure that they remain relatively well-off; rich

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and the US.

[10] Note that the Gini of 66 is the value that would obtain if two-thirds of the world population had zero income, and one-third divided the entire income of the world equally.

Indians may reach the level of world middle class but climbing further will be difficult: both because of high national taxes, and potential political instability that such ostentatious wealth in the middle of poverty might bring about. Thus people can explain, a little bit, the curse or the blessing of their countries' mean income, but significant income mobility—independent of the country's growth record—is unlikely. Migration might, in many cases, represent a better option for many people from the poor countries. Their incomes would, almost in a flash, increase. But that's where impediments to migration come into the play. As it was pointed out (e.g. by Tullock), the today's definition of citizenship is to have access to a number of welfare benefits that keep even the bottom of income distribution in the rich countries well off. Thus the poor people from the poor countries will either have to be absorbed and their incomes increased, or they have to be kept out.

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Appendix 1. All the countries included in the sample
(ranked by $PPP income level)

| | Population | Mean Income/expenditures | Mean rank | Gini | Overlap |
|---|---|---|---|---|---|
| Georgia | 0.001 | 264 | 0.08 | 0.243 | 0.37 |
| Zambia | 0.002 | 316 | 0.12 | 0.513 | 0.73 |
| Uzbekistan | 0.004 | 344 | 0.13 | 0.331 | 0.53 |
| Madagascar | 0.003 | 362 | 0.13 | 0.445 | 0.74 |
| Armenia | 0.001 | 367 | 0.13 | 0.431 | 0.72 |
| Kyrgyz Republic | 0.001 | 397 | 0.16 | 0.428 | 0.70 |
| Mali | 0.002 | 453 | 0.17 | 0.488 | 0.87 |
| Burkina | 0.002 | 469 | 0.17 | 0.466 | 0.88 |
| Senegal | 0.002 | 510 | 0.19 | 0.519 | 0.91 |
| Central African Republic | 0.001 | 512 | 0.18 | 0.595 | 1.00 |
| Gambia | 0.000 | 522 | 0.20 | 0.463 | 0.84 |
| India | 0.180 | 524 | 0.23 | 0.328 | 0.69 |
| Mongolia | 0.000 | 610 | 0.28 | 0.312 | 0.63 |
| Niger | 0.002 | 612 | 0.27 | 0.354 | 0.73 |
| Uganda | 0.004 | 622 | 0.26 | 0.380 | 0.76 |
| Kazakhstan | 0.003 | 637 | 0.29 | 0.318 | 0.66 |
| Nepal | 0.004 | 643 | 0.25 | 0.438 | 0.87 |
| Bangladesh | 0.023 | 706 | 0.33 | 0.281 | 0.61 |
| Ethiopia | 0.011 | 738 | 0.30 | 0.385 | 0.79 |
| Nigeria | 0.021 | 752 | 0.30 | 0.441 | 0.84 |
| Pakistan | 0.024 | 798 | 0.37 | 0.299 | 0.62 |
| Vietnam | 0.014 | 806 | 0.36 | 0.328 | 0.67 |
| Ivory Coast | 0.003 | 878 | 0.37 | 0.360 | 0.71 |
| Indonesia | 0.037 | 884 | 0.39 | 0.319 | 0.64 |
| Lesotho | 0.000 | 901 | 0.29 | 0.565 | 1.03 |
| Laos | 0.001 | 945 | 0.42 | 0.295 | 0.59 |
| Tanzania | 0.006 | 1037 | 0.42 | 0.363 | 0.71 |
| Turkmenistan | 0.001 | 1095 | 0.45 | 0.351 | 0.65 |
| China | 0.238 | 1122 | 0.44 | 0.381 | 0.71 |
| Kenya | 0.006 | 1147 | 0.34 | 0.572 | 1.03 |
| Philippines | 0.013 | 1236 | 0.44 | 0.426 | 0.75 |
| Albania | 0.001 | 1293 | 0.52 | 0.286 | 0.51 |
| El Salvador | 0.000 | 1294 | 0.41 | 0.504 | 0.89 |
| Moldova | 0.001 | 1333 | 0.49 | 0.372 | 0.67 |
| Honduras | 0.001 | 1366 | 0.40 | 0.546 | 0.96 |
| Mauritania | 0.000 | 1506 | 0.51 | 0.380 | 0.66 |
| Guinea | 0.001 | 1508 | 0.51 | 0.395 | 0.66 |
| Guinea-Bissau | 0.000 | 1531 | 0.42 | 0.545 | 0.95 |
| Peru | 0.005 | 1618 | 0.48 | 0.483 | 0.84 |
| Romania | 0.005 | 1641 | 0.57 | 0.321 | 0.53 |
| Ghana | 0.003 | 1664 | 0.57 | 0.330 | 0.52 |
| Jamaica | 0.000 | 1674 | 0.55 | 0.372 | 0.60 |
| Papua New Guinea | 0.001 | 1743 | 0.58 | 0.326 | 0.52 |
| Egypt | 0.011 | 1897 | 0.63 | 0.265 | 0.37 |
| Djibouti | 0.000 | 1964 | 0.58 | 0.390 | 0.60 |

| | | | | | |
|---|---|---|---|---|---|
| Thailand | 0.012 | 2001 | 0.56 | 0.456 | 0.67 |
| Belarus | 0.002 | 2045 | 0.64 | 0.282 | 0.40 |
| Ukraine | 0.010 | 2053 | 0.57 | 0.428 | 0.66 |
| Tunisia | 0.002 | 2177 | 0.64 | 0.325 | 0.45 |
| Bolivia | 0.002 | 2183 | 0.55 | 0.502 | 0.77 |
| Morocco | 0.005 | 2276 | 0.63 | 0.362 | 0.52 |
| Latvia | 0.001 | 2312 | 0.67 | 0.279 | 0.38 |
| Yemen Republic | 0.002 | 2361 | 0.64 | 0.355 | 0.51 |
| Poland | 0.008 | 2378 | 0.67 | 0.282 | 0.40 |
| Algeria | 0.005 | 2455 | 0.66 | 0.346 | 0.46 |
| Venezuela | 0.004 | 2502 | 0.63 | 0.418 | 0.57 |
| Turkey | 0.012 | 2578 | 0.62 | 0.448 | 0.63 |
| FRYugoslavia | 0.002 | 2634 | 0.63 | 0.438 | 0.61 |
| Estonia | 0.000 | 2634 | 0.66 | 0.383 | 0.49 |
| Lithuania | 0.001 | 2818 | 0.68 | 0.369 | 0.47 |
| Guyana | 0.000 | 2889 | 0.63 | 0.490 | 0.67 |
| Hungary | 0.002 | 2971 | 0.73 | 0.225 | 0.25 |
| South Africa | 0.008 | 3036 | 0.57 | 0.577 | 0.84 |
| Bulgaria | 0.002 | 3161 | 0.71 | 0.334 | 0.40 |
| Jordan | 0.001 | 3222 | 0.71 | 0.352 | 0.40 |
| Namibia | 0.000 | 3254 | 0.45 | 0.707 | 1.15 |
| Ecuador | 0.002 | 3256 | 0.69 | 0.407 | 0.48 |
| Costa Rica | 0.001 | 3306 | 0.67 | 0.444 | 0.60 |
| Dominican Republic | 0.002 | 3335 | 0.66 | 0.468 | 0.61 |
| Brazil | 0.031 | 3473 | 0.59 | 0.590 | 0.84 |
| Argentina (urban) | 0.006 | 3568 | 0.64 | 0.496 | 0.74 |
| Panama | 0.000 | 3669 | 0.61 | 0.559 | 0.83 |
| Slovak Rep. | 0.001 | 3712 | 0.78 | 0.178 | 0.16 |
| Swaziland | 0.000 | 3877 | 0.63 | 0.580 | 0.77 |
| Paraguay | 0.001 | 3886 | 0.62 | 0.569 | 0.80 |
| Russia | 0.030 | 4114 | 0.73 | 0.393 | 0.48 |
| Mexico | 0.018 | 4208 | 0.69 | 0.519 | 0.63 |
| Nicaragua | 0.001 | 4338 | 0.71 | 0.501 | 0.56 |
| Uruguay (urban) | 0.001 | 4505 | 0.74 | 0.425 | 0.48 |
| Slovenia | 0.000 | 4616 | 0.80 | 0.239 | 0.22 |
| Czech Rep. | 0.002 | 4678 | 0.81 | 0.216 | 0.20 |
| Colombia | 0.007 | 4911 | 0.73 | 0.488 | 0.56 |
| Malaysia | 0.004 | 5583 | 0.77 | 0.463 | 0.46 |
| Ireland | 0.001 | 5662 | 0.81 | 0.284 | 0.31 |
| Austria | 0.002 | 6314 | 0.75 | 0.472 | 0.62 |
| Israel | 0.001 | 6438 | 0.83 | 0.347 | 0.30 |
| Chile | 0.003 | 6476 | 0.75 | 0.564 | 0.53 |
| Singapore | 0.001 | 7431 | 0.83 | 0.417 | 0.34 |
| Portugal | 0.002 | 7470 | 0.85 | 0.348 | 0.28 |
| Greece | 0.002 | 7837 | 0.86 | 0.320 | 0.26 |
| Italy | 0.011 | 8019 | 0.86 | 0.306 | 0.25 |
| Belgium | 0.002 | 8401 | 0.88 | 0.246 | 0.20 |
| Taiwan | 0.004 | 8867 | 0.88 | 0.293 | 0.22 |
| Australia | 0.004 | 9087 | 0.86 | 0.345 | 0.32 |
| U. K. | 0.012 | 9440 | 0.87 | 0.354 | 0.27 |
| Sweden | 0.002 | 9451 | 0.89 | 0.249 | 0.20 |
| Netherlands | 0.003 | 9625 | 0.88 | 0.311 | 0.24 |

| | | | | | |
|---|---|---|---|---|---|
| South Korea | 0.009 | 9666 | 0.89 | 0.310 | 0.23 |
| Finland | 0.001 | 10075 | 0.90 | 0.226 | 0.17 |
| Cyprus | 0.000 | 10288 | 0.90 | 0.297 | 0.22 |
| Germany | 0.016 | 10340 | 0.90 | 0.294 | 0.21 |
| France | 0.011 | 10349 | 0.89 | 0.326 | 0.23 |
| Norway | 0.001 | 10651 | 0.91 | 0.247 | 0.17 |
| Japan | 0.025 | 11668 | 0.92 | 0.243 | 0.16 |
| Canada | 0.006 | 11674 | 0.91 | 0.310 | 0.21 |
| U. S. A. | 0.051 | 12321 | 0.89 | 0.394 | 0.29 |
| Denmark | 0.001 | 12371 | 0.92 | 0.246 | 0.17 |
| New Zealand | 0.001 | 12648 | 0.83 | 0.430 | 0.60 |
| Hong Kong | 0.001 | 12935 | 0.88 | 0.497 | 0.29 |
| Switzerland | 0.001 | 14068 | 0.92 | 0.324 | 0.21 |

| | |
|---|---|
| Between-country Gini | 0.498<br>(75.6%) |
| Within-country Gini | 0.161<br>(24.4%) |
| World Gini | 0.659 |
| Mean World Income | 3030.805 |

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